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OCTOBER TERM, 1998

KUMHO TIRE COMPANY, LTD., *ET AL.*,
Petitioners,

v.

PATRICK CARMICHAEL, *ET AL.*,
Respondents.

On Writ of Certiorari to the United States Court of Appeals for the Eleventh Circuit

BRIEF OF THE NATIONAL ACADEMY OF ENGINEERING AS *AMICUS CURIAE* IN SUPPORT OF PETITIONERS

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INTEREST OF THE *AMICUS CURIAE* [1]

The National Academy of Engineering ("NAE" or "Academy") is a non-profit, private organization that was created under the Congressional charter of its sister organization, the National Academy of Sciences. Pursuant to

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[1] Pursuant to Supreme Court Rule 37.6, the National Academy of Engineering states that no counsel for a party has authored this brief in whole or in part, and that no person or entity, other than the Academy or its members, has made a monetary contribution to the preparation or submission of this brief. Pursuant to Supreme Court Rule 37.3(a), the Academy states that the parties have consented to the filing of this brief.

that charter, the Academies "shall, whenever called upon by any department of the Government, investigate, examine, experiment and report upon any subject of science or art." 36 U.S.C. § 253. Such requests are most often handled by the National Research Council — the operating arm of the Academies. *See* Exec. Order No. 12,832, 58 Fed. Reg. 5,905 (1993). Of special concern to the NAE are matters of national import relating to engineering, the constantly changing needs of the Nation and the technical resources that can and should be applied to them, and the promotion of cooperation in engineering in the United States and abroad. The Academy has approximately 2,000 members and foreign associates; election to membership is considered one of the highest professional honors that an engineer can achieve.

In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), this Court established the framework governing admission of expert testimony in the sciences. This case presents the opportunity to clarify how courts should evaluate and screen expert testimony in the field of engineering. The Academy files this brief because engineers have an interest in assuring that their work is understood and properly applied by others in society, and because of the Academy's continuing interest and involvement in issues involving the intersection of engineering and law. The Academy seeks to assure that courts avoid reliance on expert testimony on engineering matters that does not reflect the proper application of the norms of the engineering profession.

SUMMARY OF ARGUMENT

In *Daubert* this Court explained that Federal Rule of Evidence 702 requires trial judges to screen expert testimony in the sciences so as to assure that any such testimony is both relevant and reliable. 509 U.S. at 589-92. Because Rule 702

relates not only to "scientific . . . knowledge," but also to "technical or other specialized knowledge," the Court should confirm that the same conceptual framework applies to the admission of all expert testimony.

Expert testimony in engineering should be admitted only if that testimony is found to have a reliable basis in the knowledge and experience of the engineering discipline. Engineering, although differing in many respects from science, is founded on scientific understanding. In particular, the development of detailed understanding of the causes of the failure of an engineered device is a central feature of engineering; this effort involves a scientific-style investigation to understand the mechanism of failure at a fundamental, quantitative level. The various *Daubert* factors for assessing the reliability of scientific testimony apply squarely to such engineering testimony.

ARGUMENT

Daubert held that the Federal Rules of Evidence require trial judges to perform a "gatekeeping role" in the admission of expert scientific testimony so as to assure that such testimony is both relevant and reliable. 509 U.S. at 589, 597 n.7. The Court defined a non-exclusive set of factors that could be applied to assess the reliability of scientific testimony. *Id.* at 593-94.

The Academy files this brief in support of two propositions. First, the Court should confirm that Federal Rule of Evidence 702 requires that the admission of all expert testimony must be guided by careful and thorough evaluation of that testimony's relevance and reliability. Second, the Court should establish that the judicial assessment of the reliability of engineering testimony should be made by

considering the factors that are applied by the engineering community in assessing reliability. Those factors parallel the factors discussed in *Daubert* for the assessment of scientific testimony.

I. RULE 702 CALLS FOR A THRESHOLD DETERMINATION OF RELIABILITY FOR EXPERT TESTIMONY ON ENGINEERING QUESTIONS.

Rule 702 requires that expert scientific testimony must be based on "scientific . . . knowledge" that will "assist the trier of fact . . . ."[2/] The *Daubert* Court construed this language to establish a standard of evidentiary reliability and relevance. 509 U.S. at 589-92. Rule 702, however, makes reference not only to "scientific . . . knowledge," but also to "technical, or other specialized knowledge." Viewed in light of *Daubert*, the language and structure of Rule 702 provide a single conceptual framework to guide the admissibility of *all* expert testimony. Indeed, there is no logical basis for applying a lower standard of trustworthiness to expert testimony in fields outside the scientific arena than to expert testimony in the sciences.[3/]

[2/] Rule 702 provides:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

Fed. R. Evid. 702.

[3/] Although some may be concerned that scientific testimony requires special scrutiny because its subject matter is presumed to be beyond the knowledge of the jury, the same concerns in fact apply to all expert (continued...)

A witness whose training or experience indicates specialized knowledge does not "assist the trier of fact" within the meaning of Rule 702 if the witness merely invokes the authoritative stature of a particular discipline. The same esoteric knowledge that could make such an expert's testimony useful in appropriate cases could enable such a putative expert to confuse or mislead the jury in others. This danger calls for study, not only of the expert's credentials, but also of the relevance and reliability of the expert's testimony.

Such scrutiny is warranted because in technical and other specialized fields, as in the sciences, some experts with impressive experience and credentials may base their opinions on theories or techniques that are not compatible with the norms of the relevant discipline. As with scientific knowledge, "something doesn't become '[technical] knowledge' just because it's uttered by a[n] [engineer]; nor can an expert's self-serving assertion that his conclusions were 'derived by the [engineering] method' be deemed conclusive." *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1315-16 (9th Cir. 1995) ("*Daubert II*").

In light of these considerations, the Court should confirm that all expert testimony is subject to the judicial gatekeeper's threshold determination of relevance and reliability. "There is no reason for an arbitrary classification [of fields of knowledge] to govern whether evidence relied on by the jury should be held to a lower standard of trustworthiness."

[3/](...continued)
testimony. The factfinder's presumed ignorance of the subject matter is the basis for admitting *any* expert testimony under Rule 702. *See* Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 52 (1901) (explaining that the role of an expert witness is to furnish "general propositions" that are outside of the common knowledge of lay factfinders).

Developments in the Law—Confronting the New Challenges of Scientific Evidence, 108 HARV. L. REV. 1481, 1527 (1995); *see also* American College of Trial Lawyers, *Standards and Procedures for Determining the Admissibility of Expert Evidence After* Daubert, 157 F.R.D. 571, 577 (1994) (advocating "a single conceptual framework for evaluating the admissibility of all types of expert evidence").

II. THE INDICIA OF RELIABILITY IDENTIFIED IN *DAUBERT* MAY PROPERLY BE CONSIDERED IN DETERMINING THE RELIABILITY OF CERTAIN ENGINEERING TESTIMONY.

We now turn to the factors that should be considered in assessing the reliability of expert engineering testimony. The Academy asserts that evidentiary reliability should be measured using the same factors that are applied by the engineering profession to assess reliability. We then describe some of those factors.

A. The Assessment Of The Reliability Of Engineering Testimony Should Be Guided By The Norms Of The Engineering Profession.

In developing the factors that should guide the assessment of the reliability of scientific evidence, the *Daubert* Court observed that "the requirement that an expert's testimony pertain to 'scientific knowledge' establishes a standard of evidentiary reliability," and held that "[i]n a case involving scientific evidence, *scientific reliability* will be based upon *scientific validity*." 509 U.S. at 590-91 & n.9 (emphasis in original). The Court recognized that the "wide latitude to offer opinions, including those that are not based on firsthand knowledge or observation" that is given to experts by Rule 702 "is premised on an assumption that the expert's opinion will have a reliable basis in the knowledge and experience of

his discipline." *Id.* at 592. Thus, the Court held that scientific testimony, to be admissible, must conform to scientific standards and should be evaluated using the techniques applied by the scientific community in assessing validity.

Exactly the same logic should apply in this case. Expert testimony in engineering, just like expert testimony in the sciences, should be admitted only if the testimony is found to have a reliable basis in the knowledge and experience of the engineering discipline.[4/] Testimony that is not rooted in such knowledge and experience is at best useless, and at worst misleading to the trier of fact.[5/]

Daubert identifies four illustrative factors that can guide a court's assessment of the reliability of the theory or technique upon which proffered scientific evidence rests: (1) whether it can be tested empirically; (2) whether it has been subjected to peer review and publication; (3) whether its error rate is acceptable; and (4) whether it has achieved general acceptance in the relevant discipline. *Id.* at 593-94. We recognize that the rules applied by scientists in assessing the reliability of scientific evidence may depart from those applied in other fields. Accordingly, in evaluating the admissibility of engineering testimony, a court should consider the factors that

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[4/] *See also* Fed. R. Evid. 703 (facts or data upon which an expert bases an opinion need not be admissible in evidence if "of a type reasonably relied upon by *experts in the particular field* in forming opinions or inferences upon the subject") (emphasis added).

[5/] *See also Deimer v. Cincinnati Sub-Zero Products, Inc.*, 58 F.3d 341, 345 (7th Cir. 1995) ("unsubstantiated testimony plainly provides no basis for relaxing the usual first-hand knowledge requirement of the Federal Rules of Evidence on the ground that the expert's opinion has a reliable basis in knowledge and experience of his discipline").

would be applied by the engineering community to assess reliability.

B. Scientifically Based Evaluation Is A Central Element Of Engineering.

An examination of the nature of engineering and of the types of analyses that engineers perform reveals the central role of science in engineering.

1. What Is Engineering?

Engineering encompasses a wide range of human activities, but fundamentally it "involves the design, construction, and operation of artifacts" — the man-made modification of nature. George Bugliarello, *The Social Function of Engineering: A Current Assessment*, in ENGINEERING AS A SOCIAL ENTERPRISE 73, 86 n.1 (Hedy E. Sladovich, ed., 1991). Common examples of such artifacts include objects of immediate use (such as an automobile, a bridge, a house, a television), or machines that facilitate the manufacture of a useful object (a crane, a welding robot, a printing press), or a sequence of machines that achieve an intended end (an automotive assembly line, a paper mill, a chemical plant).

Like other professionals, engineers "have special skills . . . [that] flow from a body of theoretical knowledge . . . ." M. DAVID BURGHARDT, INTRODUCTION TO THE ENGINEERING PROFESSION 88 (1991). Although engineers specialize in fields as disparate as civil, mechanical, electrical, chemical, biomedical, agricultural, architectural, metallurgical, structural, aeronautical, nuclear, geological, petroleum, mining, safety, and automotive engineering, they share a

common emphasis on analysis and design that is fundamental to engineering as a professional discipline.[9]

Engineering differs in important respects from science. Science focuses on *understanding* nature, by the application of a process of testing, experiment, and validation. *Daubert*, 509 U.S. at 590. Engineering, by contrast, focuses on *modifying* nature to achieve a benefit or objective for humanity. George Bugliarello, *Engineering and the Crossroads of Our Species*, 28 THE BRIDGE 9, 10 (No. 1, Spring 1998). Thus, while scientists concern themselves with what *is*, engineers strive to create what *can be*. Wm. A. Wulf, *The Urgency of Engineering Education Reform*, 28 THE BRIDGE 4, 4-5 (No. 1, Spring 1998).

A crucial aspect of engineering is that it often involves design under constraint. *Id.* at 5. An engineer typically does not have the luxury to build whatever nature may allow. Rather, he or she is confined not only by nature, but also typically by concerns of cost, safety, reliability, environmental impact, difficulty of fabrication (manufacturability), ease of maintenance, regulatory requirements, and other considerations. *Id.* Thus, an engineer's work in the design of a product or process is typically guided by a complex matrix of factors.

This is not to suggest, however, that scientific understanding is irrelevant to the engineer. Quite the contrary, science provides the foundation for the engineer's work. "The methodology of engineering is a general

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[9] Like members of other professions, engineers have special responsibilities that are reflected in the codes of ethics that have been adopted by many engineering organizations. *See, e.g.*, National Society of Professional Engineers Code of Ethics for Engineers (1987), *reprinted in* BURGHARDT, *supra*, at 233-40.

problem-solving one that resorts heavily to the sciences and mathematics." Bugliarello, *The Social Function of Engineering*, *supra*, at 86 n.1. Scientific principles — Newton's laws governing energy and momentum, the laws of thermodynamics governing efficiency and the transfer of heat, the Maxwell equations governing the properties of electricity and magnetism, and the many other riches in the scientific treasury — are applied in engineering by revealing the limitations and opportunities that nature provides in the development of things of value to mankind. Indeed, scientific gains often open opportunities for the engineer. For example, advances in condensed-matter physics provided the capability for engineers to develop the microchips that are the heart of the unfolding computer and communications revolution.

The significance of science in the practice of engineering is revealed by engineering education. The curriculum typically requires would-be engineers to study, at a minimum, chemistry, physics, material science, and mechanics, as well as calculus and other courses in mathematics. *See* BURGHARDT, *supra*, at 12-13. Some tracks in the engineering curriculum require courses in thermodynamics, aerodynamics, geology, biology, atomic physics, and other scientific topics.

This focus on science in the education of engineers reflects the bedrock fact that engineering, like science, must be guided by nature's truths. In designing a bridge, for example, the engineer must satisfy himself that the design is sufficiently strong so as to withstand expected wind loads by quantitative analysis applying scientific principles concerning the behavior of materials under stress.[7/] There is an element of judgment in such work in defining the maximum expected

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[7/] The failure adequately to take such natural forces into account led to the famous collapse of the Tacoma Narrows Bridge in 1940. *See* HENRY PETROSKI, ENGINEERS OF DREAMS 301-02 (1995).

load and the appropriate margin of safety.[8/] But quantitative analysis, based on scientific principles, is applied to assure that the load requirement is satisfied.

2. The Evaluation Of Engineered Artifacts.

On occasion, science may show that it is impossible for a design to function as intended (*e.g.*, a perpetual motion machine) and thus considerations of science alone may suffice to show that an engineering design is a failure. In the typical case, however, a more nuanced consideration is necessary because a design may reflect a series of tradeoffs to reflect a variety of constraints. Thus, the evaluation of the adequacy of an engineering design usually must include considerations that extend beyond science.

For example, it certainly would be possible to construct an automobile that is more durable than those that are now on the road. But automobiles reflect a compromise between the multiple objectives of durability, cost, performance, comfort, environmental compliance, safety, fuel economy, and many other factors. Thus, the fact that an automobile does not attain the maximum lifetime that science might allow does not necessarily reflect a failure in the underlying design engineering.

Nonetheless, some engineered devices do fail and understanding the mechanism of failure is a central feature of

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[8/] In routine engineering work, such as bridge design, these judgments are often codified in state regulations or in building codes. At the other extreme, when first-of-a-kind systems are developed — the Apollo spacecraft, for example — the engineer must make design judgments without such specific guidance.

engineering. In fact, the analysis of the failure of engineered devices is a vitally important aspect of the work of engineers:

> The subject of mechanical pathology is relatively as legitimate and important a study to the engineer as medical pathology is to the physician. While we expect the physician to be familiar with physiology, without pathology he would be of little use to his fellow-men, and it [is] as much within the province of the engineer to investigate causes, study symptoms, and find remedies for mechanical failures as it is "to direct the sources of power in nature for the use and convenience of man."

HENRY PETROSKI, DESIGN PARADIGMS: CASE HISTORIES OF ERROR AND JUDGMENT IN ENGINEERING 98 (1994) (quoting George Thomson, *American Bridge Failures: Mechanical Pathology, Considered in Its Relation to Bridge Design*, ENGINEERING, 252-53 (Sept. 14, 1888)).

Thus, the study of the failure of artifacts is central to engineering; engineers seek to understand the mechanisms of failure so as to assure that the performance of an engineered device will behave as expected. For example, the mechanisms for the failure of a column in a building are understood in detail at a quantitative level so the engineer can reliably predict that a column of a certain size and material in a building can bear the expected loads. Similarly, engineers frequently test a device to failure, studying the mechanism of failure, and evaluating improvements that might limit or eliminate the failure mode. The modification of a design to remove or minimize the probable failure modes is a common means of improving a design.

C. The *Daubert* Factors May Be Applied To The Evaluation Of Engineering Testimony.

Litigation over engineering matters frequently may involve the evaluation of engineered devices. For example, an injury might result from an automobile accident and the suit may involve testimony from engineers about the nature of the accident; whether a component failed (*e.g.*, whether the accident resulted from non-functioning brakes); and, if so, the causes of the failure (*e.g.*, whether the brake design was defective). All of this testimony implicates science in the sense that the engineer is required to evaluate the evidence and to rely on scientific principles and scientific-style investigation to support his or her conclusions.

In particular, an engineer's evaluation of how a failure occurred is closely parallel to a scientific evaluation. As discussed above, in practicing his profession, the engineer seeks to understand the mechanism of failure at a fundamental level so as to eliminate it if possible (subject to other constraints), or at least to assure that the failure is acceptable (because, for example, it occurs at loads beyond normal use). Thus, just as in science, the engineer must engage in a process for proposing and refining theoretical explanations that are subject to testing and refinement. *See Daubert*, 509 U.S. at 590. Indeed, just as in science, the engineer will often seek to explain the failure in mathematical terms so that the mechanism of failure can be subject to quantitative prediction and evaluation.

On occasion, engineers might find themselves testifying on matters that involve a broader set of considerations than the results of scientific-style inquiry. For example, an engineer may sometimes be asked to provide testimony on whether an engineered device contains a design defect. Such testimony would encompass not only the mechanism of failure, but also

whether the failure resulted from a flawed design. In that situation, the testimony must involve not only the scientific aspects of the engineer's work, but also the tradeoffs among the variety of constraints — cost, manufacturability, safety, environmental impact, and so forth — that affect an engineering design. The latter aspect of the engineer's opinion encompasses issues of judgment and experience that extend beyond science. Hence the assessment of the reliability of that part of the engineer's testimony will involve considerations in addition to purely scientific matters.

Nonetheless, although engineers may on occasion testify as to matters that extend beyond scientific considerations, it remains the case that the *Daubert* factors are appropriate and useful indicia of the reliability of engineering testimony in evaluating the causes of the failure of an engineered device:

Empirical Testability. The first *Daubert* factor — whether the theory or technique can be empirically tested — is completely consistent with the engineering discipline's reliance on testing to understand the causes of failure.[9/] For example, a board of engineers appointed to investigate the failure of the Tacoma Narrows Bridge stated that "'further experiments and analytical studies are desirable to investigate the action of aerodynamic forces on suspension bridges'" that were believed to have caused the bridge to collapse. PETROSKI, ENGINEERS OF DREAMS, *supra*, at 305-06 (quoting O.H. Ammann, *et al.*, *The Failure of the Tacoma Narrows*

[9/] "[W]hether the proffered methodology can be and has been tested may very well be pertinent to an examination of non-scientific but 'technical' expert evidence." American College of Trial Lawyers, *supra*, 157 F.R.D. at 579.

Bridge (Federal Works Agency, 1941)).[10/] In more mundane contexts, such as the investigation of the failure modes of tires, experiments and tests are often performed. *See*, *e.g.*, BURGHARDT, *supra*, at 79 (illustrating testing of a tire's failure modes). In short, just as in science, the testing of hypotheses is central to the development of an understanding of the mechanism of failure.[11/]

Moreover, given the engineering discipline's frequent reliance on quantitative analysis, whether or not the basis for an opinion can be measured, calculated, or otherwise objectively quantified is an important criterion for assessing the reliability of engineering testimony.

Peer Review and Publication. Whether or not an engineer's theory or technique for investigating failure has been published or subjected to peer review also is relevant to determining its reliability. As in science, information is disseminated within the engineering community by a large number of refereed technical journals.[12/] Contributors to

[10/] Extensive testing was also performed to analyze the cause of the explosion of the space shuttle *Challenger* in 1986. *See* U.S. Presidential Commission, *Report to the President on the Space Shuttle* Challenger *Accident* (1986).

[11/] In some situations the mechanism of failure is sufficiently understood as to allow the assessment of the cause of failure in an individual case without further testing or experimentation. For example, in determining the cause of the failure of a building column, the engineer may calculate that an excessive load was imposed by applying generally accepted formulae or standards. In such a case, the underlying formulae or standards have been developed on the basis of scientific-style investigation and analysis.

[12/] The three largest engineering societies — the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the Institute

(continued...)

such journals include engineering scholars and, to a lesser extent, practicing engineers who work in industry, government, and other areas. As in science, peer review and publication are "not a *sine qua non*" of reliability, but they similarly "increase[] the likelihood that substantive flaws in methodology will be detected." *Daubert*, 509 U.S. at 593. Such publication weighs in favor of deeming a theory or technique reliable, whereas the expert's refusal to share a new insight for understanding failure with the relevant engineering community weighs against that conclusion.

Rate of Error. Because engineers frequently rely on calculations and testing, "the known or potential rate of error" (*id.* at 594) of a technique for evaluating failure bears directly on that technique's validity within the engineering discipline.

Degree of Acceptance. General acceptance or widespread rejection of a theory or technique by the professional community is as relevant to determining reliability in engineering as it is in science. Among engineers, "'a known technique which has been able to attract only minimal support within the community' . . . may properly be viewed with skepticism." *Id.* (quoting *United States v. Downing*, 753 F.2d 1224, 1238 (3d Cir. 1985)). Indeed, the engineering profession may often rely on consensus judgments to a greater extent than the scientific community. Engineers, working through their professional societies, the American National Standards Institute, and other bodies, have formulated technical standards that apply to the design or testing of a wide variety of products and processes. Although many of these standards are intended merely to provide a uniform basis for compatible designs — thus allowing products

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[12/](...continued)
of Electronics and Electrical Engineers — together publish more than 100 peer-reviewed technical journals.

of different manufacturers to work together properly — others establish standards for safe and effective design. Such standards are frequently incorporated by governmental bodies into building codes and other regulatory regimes.[13/] The degree to which an expert witness's testimony conforms to or conflicts with such standards is a proper indicator of engineering reliability.

Finally, various other factors that courts have applied in assessing scientific testimony may also have an appropriate application to engineering testimony.[14/] For example, the extent to which an expert's methodology relies on subjective interpretation is a potentially relevant criterion that is related to *Daubert*'s testability or falsifiability factor. *See E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 556-57 (Tex. 1995). Similarly, skepticism regarding scientific opinions that are developed solely for litigation applies equally to opinions on engineering issues. *See Daubert II*, 43 F.3d at 1317. The important point is that the *Daubert* factors are examples of the *kinds* of criteria that a trial court may appropriately examine in performing its threshold

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[13/] *See, e.g.*, 10 CFR § 34.20 (1998) (incorporation of ANSI standard in NRC regulation); 16 CFR § 1203.3 (1998) (same, CPSC); 24 CFR § 3280.403 (1998) (same, HUD); 29 CFR § 1910.67 (1997) (same, OSHA); 30 CFR § 70.511 (1997) (same, MSHA); 40 CFR Part 80, Appendix D (1997) (same, EPA); 46 CFR § 56.50-15 (1997) (same, Coast Guard); 47 CFR § 2.1093 (1997) (same, FCC).

[14/] The Court emphasized in *Daubert* that the indicia of reliability discussed in its opinion did not comprise a comprehensive or exclusive list. 509 U.S. at 593.

determination as to whether proposed engineering testimony is based on "technical knowledge."[15/]

This Court recently stressed in the context of expert scientific testimony that "nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence which is connected to existing data only by the *ipse dixit* of the expert." *General Elec. Co. v. Joiner*, 118 S. Ct. 512, 519 (1997). This same rule should apply to expert engineering testimony. As the Fifth Circuit has observed:

> [I]t seems exactly backwards that experts who purport to rely on general engineering principles and practical experience might escape screening by the district court simply by stating that their conclusions were not reached by any particular method or technique. The moral of this approach would be, the less factual support for an expert's opinion, the better.

Watkins v. Telsmith, Inc., 121 F.3d 984, 991 (5th Cir. 1997). The Academy agrees. Because engineers work within the norms of a professional discipline, expert testimony that purports to represent the knowledge and experience of that profession must be based on reliable "technical knowledge." The indicia of reliability identified in *Daubert* can be

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15/ In holding that the *Daubert* factors are irrelevant to technical experts, the court of appeals below seems to have been led astray by reliance on an analogy comparing the testimony of the tire failure expert in this case to the observations of a beekeeper. *See Berkey v. Third Ave. Ry.*, 244 N.Y. 84, 94 (1926) (Cardozo, J.) ("Metaphors in law are to be narrowly watched for, starting as devices to liberate thought, they end often by enslaving it.") Unlike the beekeeper, who could testify as to bees' usual takeoff direction on the basis of first-hand observation, the expert here was required to extrapolate from his observations about tire "carcasses" as to matters that he did not directly observe.

appropriate guides for determining whether this requirement is satisfied.

CONCLUSION

For the foregoing reasons, the Academy urges this Court to hold that Rule 702 requires a threshold determination of the relevance and reliability of all expert testimony, and that the *Daubert* factors may be applied to evaluate the admissibility of expert engineering testimony.

Respectfully submitted,

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